WESTCARB Quarterly Report: October 1, 2005 to December 31, 2005

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Highlights

- Phase II activities are now underway.
- A location for the Northern California Pilot Test has been selected.

Project Milestones

Task	Deliverable Date
Develop project management plan for Rio Vista Pilot Tests • Detailed project breakdown structure and roles and responsibilities have been developed. • A detailed resource loaded schedule will be developed by the end on January.	December 30, 2005 • This task will be completed by January 30, 2006. • Funds were not received to begin this work until mid-November, 2005.
Develop conceptual pilot test plan	March 30, 2006
Complete documentation for NEPA process	June 30, 2006
Develop detailed pilot test plan	September 30, 2006

Research Progress Report

Task 1. Provide technical leadership and scientific support for two pilot tests of CO_2 storage in a northern California gas reservoir and underlying saline formation.

The Sacramento Valley contains numerous gas fields that are estimated to have a CO_2 storage capacity on the order of 3 billion tonnes of CO_2. In addition, the surrounding saline formations in the Great Central Valley – which spans nearly1000 km along the center of the State, has an estimated storage capacity of 90 – 340 billion tonnes of CO_2. These tests will assess the storage potential of these promising formations and, in addition, this will be the first field-scale test of CO_2 Storage Enhanced Gas Recovery. The CO_2 storage pilot test in the gas reservoir and underlying saline formation has five objectives:

1. Test the feasibility and safety of CO_2 storage in large depleting gas field in Northern California;

2. Test the feasibility of Enhanced Gas Recovery associated with the early stages of a CO_2 storage project in a depleting gas field;
3. Demonstrate the safety and feasibility of CO_2 storage in saline formations in the vast northern regions of the Central Valley, California;
4. Demonstrate and test methods for monitoring CO_2 storage projects in gas fields; and
5. Gain experience with regulatory permitting and public outreach associated with CO_2 storage in gas reservoirs and saline formations in California.

Task 1 Results and Discussion

Site selection criteria have been developed for the pilot test. We met with our partner, Rosetta Resources, to review criteria, available data and to produce a list of pilot sites. Sites were prioritized and final site for pilot test has been selected. Follow up meetings have been held with WESTCARB partners to review project, finalize site selection, discuss project logistics and coordinate field activities.

A detailed project schedule has been prepared for Rosetta-Calpine CO_2 Storage Pilot Test. In addition, we have assigned role and responsibilities to the various members of the team for major activities. The project schedule runs to 2008 and includes the following subtasks:

- Develop a detailed project management plan and design package for Rio Vista Pilots
- Complete NEPA and CEQA documentation
- Pre-injection planning, permitting, safety and outreach
- Site preparation and baseline data collection
- Perform CO_2 injection into the saline formation
- Perform CO_2 injection into the gas reservoir and evaluate CSEGR
- Post-injection storage security confirmation
- Data analysis and reporting

Preparation of the NEPA and CEQA documentation has begun. A contractor, Aspen Environmental, will take the lead on developing the documentation. Our role is to provide detailed test design parameters and a list of activities that need to be considered in assessing environmental impacts.

Conclusion.

None to report.

Milestones met.

Our FY06 QTR 1 Milestone was to complete the project management plan for the Rio Vista Pilot. We have completed a detailed scope and schedule for the project and assigned roles and responsibilities. We have not completed a detailed resource loaded

budget for the project at the level of subtasks. We expect to complete this by the end of January.

Summary of Noteworthy Accomplishments.

The site for the pilot test has been selected.

Actual or Anticipated Problems or Delays.

Funding is needed to continue the work at a pace that will allow us to meet our project schedule.

Bibliography.

No new publications this quarter.

Task 2. A Pilot Test of CO_2 Storage in a saline formation underlying the Navajo Generating Station in Arizona.

This pilot will investigate CO_2 storage in saline formations in the Colorado Plateau region which underlies a number of large power plants located in Northern Arizona. Our partner, the Salt River Project (SRP), has interests in locating storage facilities for both existing and new power plants in the region. Estimated CO_2 emissions in this region during 2002 were approximately 30 million tons. The magnitude of the annual CO_2 emissions in this area, the large storage potential of the saline formations of the Colorado Plateau and operator cooperation makes this an outstanding opportunity for assessing geologic storage options associated with large sources of CO_2 in the West. The CO_2 storage pilot test at Salt River Project has three overall objectives:

1. Demonstrate the safety and feasibility of CO_2 storage in saline formations in the vast Colorado Plateau region in Arizona;
2. Demonstrate and test methods for monitoring CO_2 storage projects in consolidated sandstones, shale and carbonate fields; and
3. Gain experience with regulatory permitting and public outreach associated with CO_2 storage in a saline formation in Arizona.

LBNL's role in these two pilots will be to provide overall technical leadership for carryout the projects, perform modeling and monitoring and to extrapolate the results from these studies to assess the regional storage potential of these area. We will provide technical input to the development of NEPA documents for the field projects, and provide technical input for the obtaining permits from the appropriate regulatory agencies. At the heart of our approach, is a careful requirements definition phase, followed by the repeated use of detailed simulations of flow and transport processes, coupled to a geophysical imaging code. The repeated use of these tools over the project phases – requirements definition, pre-permitting, permitting and operations – allows us meet project goals, while minimizing costs, by optimizing the injection and observation well

spacing, the quantity of CO_2 injected and the suite of monitoring techniques used for the pilot tests.

Task 2 Results and Discussion

Discussions with the Salt River Project and their geotechnical consultant, Errol Montgomery, have identified possible locations for conducting the pilot test. Discussions are ongoing.

Conclusion. None to report.

Milestones met. None to report.

Summary of Noteworthy Accomplishments. None to report.

Actual or Anticipated Problems or Delays. None to report.

Bibliography. No new publications this quarter.

Task 3. Continued development of a risk assessment screening tool for selecting CO_2 storage sites.

We have developed in Phase 1 a spreadsheet-based screening-level methodology for assessing potential Health, Safety, and Environmental (HSE) risk of geologic CO_2 storage projects. The approach is based on evaluating three basic characteristics that influence HSE risk: (1) Potential of the primary target site for long-term containment of CO_2; (2) Potential for secondary containment if the primary target site leaks; (3) Potential to attenuate and/or disperse leaking CO_2 if the primary formation leaks and secondary containment fails. In Phase 2, we will continue to enhance and test the methodology through application to pilot-study and other prospective geologic sequestration sites. Enhancements under consideration are improved graphical displays, porting to a web-based platform, and consideration of distributions rather than single integers for property assessments. Peer review will be undertaken to get feedback on the utility of the tool and for guiding enhancements.

Task 3 Results and Discussion

Presentations regarding the screening tool have been made to various groups to seek feedback about the strengths and weaknesses of this approach. Based on this feedback, enhancements will be made.

Conclusion. None to report.

Milestones met. None to report.

Summary of Noteworthy Accomplishments. None to report.

Actual or Anticipated Problems or Delays. None to report.

Bibliography. No new publications this quarter.

Task 4. Outreach activities associated with the WESTCARB Project.

LBNL will lead the outreach efforts for the WESTCARB Project. Outreach activities will include meeting with community leaders, interested citizens, college students and others interested in carbon sequestration in general, and specifically, the pilot tests. Continued interactions with these groups, particularly those in communities located near the pilot projects will continue on a regular basis. Issues, concerns and opinions will be identified and the test plans, particularly the monitoring programs, will be adjusted to provide as much relevant information as possible. We will work with UC Berkeley researchers to develop a systematic way of tracking how opinions about geologic storage projects evolve of the duration of the pilot tests. We will also work closely with the other regional partnerships to share information and participate in nation-wide outreach activities.

Task 4 Results and Discussion

Discussions between Sally Benson and Rich Myhre have taken place regarding public outreach efforts with WESTCARB. The following goals have been identified and were presented at the Annual Meeting:

- Educate the public on the opportunity for carbon sequestration to curb atmospheric CO_2 buildup and associated climate impacts.
- Help policymakers and the public understand how carbon sequestration is similar to (and different from) other current land and subsurface management activities.
- Communicate the co-benefits of sequestration activities as well as the sense of helping address a major 21st century challenge
- Convey an honest recognition of risks and unknowns; communicate plans to address known risks

A public outreach committee has been established: Sally Benson (LBNL), Martha Krebs (CEC), Reid Edwards (LBNL), Rich Myhre (BKi) and Barry Biediger (Utah AGRC). This committee is also to include personnel from pilot hosts.

Phase II plans include collaboration with pilot hosts to conduct community-focused outreach activities in areas near the pilots. Participation in conferences and workshops will also continue to be important.

Another key element in public outreach is communication with the media. One example is Sally Benson's quotes in the article, "How to Clean Coal," NRDC OnEarth, Fall 2005. http://www.nrdc.org/onearth/05fal/coal1.asp. In addition, based on a tutorial provided by

Dr. Benson at the American Geophysical Union, the Oakland Tribune ran a front page story on CO_2 Capture and Storage Technology.

Conclusion. None to report.

Milestones met. None to report.

Summary of Noteworthy Accomplishments. None to report.

Actual or Anticipated Problems or Delays. None to report.

Bibliography. No new publications this quarter.

Upcoming Events

January 10, 2006. Trip to Kimberlina project site in order to tour and discuss CO_2 collbaorative efforts in the Southern part of the Great Central Valley.